Discoveries, Applications and Opportunities

June 17-19, 2014

Hyatt Regency McCormick Place
2233 S. Martin L. King Drive
Chicago, Illinois 60616

1954 2014
American Astronautical Society
60TH Anniversary

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The International Space Station (ISS) –

Scientific Laboratory
Technology Testbed
Orbiting Outpost
Galactic Observatory
Innovation Engine
Commercial Incubator
Student Inspiration
Exploration Stepping Stone

This conference focuses on ISS Research and Development — **Discoveries** in Microgravity Science; Discoveries in Space Science, Earth Science, Engineering and Education; **Applications** Benefitting Earth; Applications Enabling Technology and Exploration; and **Opportunities**.

This is the only annual gathering offering perspectives on the impressive breadth of research and technology development on the ISS – one stop for understanding the full suite of opportunities available now.

Organized by the American Astronautical Society in cooperation with the Center for the Advancement of Science in Space (CASIS) and NASA

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Center for the Advancement of Science in Space
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The Pennsylvania State University
University Park, Pennsylvania

Dr. Julie Robinson, Chief Scientist, ISS Program
NASA Johnson Space Center
Houston, Texas

Timothy Yeatman, M.D., Chief Scientist
Center for the Advancement of Science in Space
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Conference at a Glance

	MONDAY JUNE 16 **Welcome**	TUESDAY JUNE 17 **Why use ISS?**	WEDNESDAY JUNE 18 **What ISS offers.**	THURSDAY JUNE 19 **How to use ISS.**
7:00		Registration & Breakfast	Registration & Breakfast	
				Registration & Breakfast
8:00		Welcome & Keynote Speakers	Plenary Panel 3 *ISS – Pathway to Mars*	
				8:30 Plenary Panel 5 *Top Discoveries in Microgravity*
9:00				
10:00		10:20 Plenary Panel 1 *Most Compelling Results From the ISS in 2013*	Parallel Technical Session 1	10:15 Parallel Technical Session 3
11:00				
12:00		12:15 Luncheon ***Guest: Nicole Stott***	12:15 Luncheon ***Guest: John Grunsfeld***	12:15 Working Lunch ***Panel: Getting There And Back***
1:00				
2:00		2:00 Research Disciplines From The Experts	1:45 Plenary Panel 4 *Top Engineering Dev And Tech*	
3:00				2:30 Entrepreneurship On the ISS Case Studies
4:00		3:45 Plenary Panel 2 *Biotechnology, Health and Education*	3:30 Parallel Technical Session 2	
				4:30 Adjourn
5:00				
			5:30 ISS Technical Committee	
6:00	Welcome Reception at the Hotel with Posters and Displays	5:30 Reception Posters and Displays	6:00 Reception Posters and Displays	
7:00				
8:00				

Gold Sponsor

Day 1 — Monday, June 16, 2014

Welcome

6:00 pm **Welcome Reception at the Hyatt Regency McCormick Place**
- Prairie Center

Join your colleagues in a casual setting for light refreshments.

Save the Date!

4th Annual International Space Station Research and Development Conference

When:	**July 7-9, 2015**
Where:	**Boston Marriott Copley Place**
	Boston, Massachusetts (New Location)
Call for Papers:	**September 2014**

Why should I use the ISS?

– *Posters, Displays and Networking All Day in Prairie Center* –

WiFi compliments of

7:00 am **Registration Opens** (Prairie Center Lobby)
with Continental Breakfast (Grant Park Room)

7:00 am **AAS Corporate Members Breakfast** (by invitation only)
with Mike Suffredini

8:10 am **Welcome and Announcements** (Grant Park Room)
Lyn Wigbels, President of AAS

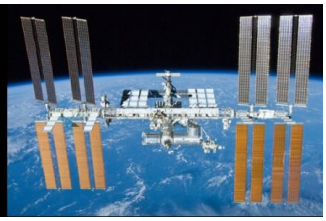
Recorded Opening Message from the Crew on the ISS

8:20 am **Introduction**
John Elbon, Vice President and General Manager Space Exploration, Boeing Defense, Space & Security

8:30 am **Keynote**
Mike Suffredini, Manager, ISS Program Office, NASA Johnson Space Center

9:00 am **Keynote**
Greg Johnson, President and Executive Director, Center for the Advancement of Science in Space (CASIS)

9:30 am **Keynote: Alpha Magnetic Spectrometer (AMS) Results and Outlook for Data Through 2024**
Nobel Laureate Professor Samuel Ting, Massachusetts Institute of Technology



10:05 am **Networking Break**

10:20 am **Plenary 1: Most Compelling Results from the ISS in 2013**

Moderator: Julie Robinson, Chief Scientist, ISS Program, NASA Johnson Space Center

- *A Microfluidic, High Throughput Protein Crystal Growth Method for Microgravity* – Carl Carruthers, Jr., NanoRacks, LLC
- *Microgravity Arrests Host Immunity in vitro: Multi Omics Approach* – Nabarun Chakraborty, US Army Center for Environmental Health Research
- *Integrated Cardiovascular Results* – Jeffrey Hastings, University of Texas Southwestern Medical Center
- *Taking Consumer Product Design to Entirely New Heights* – Matthew Lynch, The Procter and Gamble Company

12:15 pm **Luncheon** (Jackson Park Room)

Guest Speaker: Astronaut Nicole Stott (See biography on Page 18)
(followed by presentation of the AAS Advancement of International Cooperation Award)

2:00 pm **Research Disciplines From the Experts** (Grant Park Room)

Life Sciences Changes in Microgravity

- *Cellular Level Changes*, Julie Robinson, Chief Scientist, ISS Program, NASA Johnson Space Center
- *Whole Organism Level Changes* – Tara Ruttley, ISS Associate Program Scientist, NASA Johnson Space Center

2:30 pm **Physical Sciences Changes in Microgravity**

- *Combustion and Fluid Physics* – Kirt Costello, ISS Assistant Program Scientist, NASA Johnson Space Center
- *Materials Science* – Martin Volz, Materials Science Principal Investigator, NASA Marshall Space Flight Center

3:00 pm **ISS Orbit and Ground Track**

- *Applicability for Earth Observation, Astrophysics and Heliophysics* – Rod Jones, ISS Research Integration Office Manager, NASA Johnson Space Center

3:15 pm **Funding Options and Approaches**

- Mike Read, Manager, ISS National Lab Office
- Sharon Conover, Manager, ISS NASA Research Office, NASA Johnson Space Center


3:30 pm **Networking Break**

3:45 pm **Plenary 2: Biotechnology, Health and Education**

Moderator: Emily Roberge, Scientific Research Analyst, CASIS

- *Microbes, Microgravity and Microvirulence* – Timothy Hammond, Duke University School of Medicine
- *Understanding the Effects of Long-Duration Space Flight on Astronaut Functional Task Performance* – Jacob Bloomberg, NASA Johnson Space Center
- *Zero Robotics: ISS Programming Challenge* – Alvar Saenz-Otero, Massachusetts Institute of Technology
- *Sally Ride EarthKAM (Earth Knowledge Acquired by Middle School Students)* – Karen Flammer, Sally Ride Science, Inc.

5:30 pm **Networking Reception with Posters and Displays**
(Prairie Center)

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SNC SIERRA NEVADA CORPORATION Space Systems

What the ISS offers and how to get in

– *Posters, Displays and Networking All Day in Prairie Center* –

WiFi compliments of

CASIS

7:00 am **Registration** (Prairie Center Lobby)
with Continental Breakfast (Grant Park Room)
sponsored by

ULA United Launch Alliance

7:00 am **AAS 2nd Corporate Members Breakfast** (by invitation only)
with William Gerstenmaier

8:15 am **Plenary 3: ISS - Pathway to Mars** (Grant Park Room)
Moderator: Sam Scimemi, Director, International Space Station, NASA Headquarters

- *ISS to Mars Exploration* – William Gerstenmaier, Associate Administrator, Human Exploration and Operations Mission Directorate, NASA Headquarters
- *ISS Science and Exploration* – Gale Allen, NASA Deputy Chief Scientist, NASA Headquarters
- *ISS Technology and Exploration* – David Miller, NASA Chief Technologist, NASA Headquarters
- James Reuther, Deputy Associate Administrator, Space Technolog Directorate, NASA Headquarters

9:45 am **Networking Break** *sponsored by*

ULA United Launch Alliance

10:00 am **Parallel Technical Session 1** (see page 14 for details)

Room	Grant Park	Hyde Park A	Hyde Park B	Adler	Burnham B-C
Subject:	***ISS External Capabilities***	***ISS Internal Capabilities***	***Earth and Space Science***	***Biology and Biotechnology***	***Technology Demonstration 1***
Session Chair:	Bridget Ziegelaar	Steve Huning	Steve Volz	Emily Roberge	Ryan Stephan
Speaker 1	Bridget Ziegelaar	Brett Willman	James Goodman	Araceli Espinosa-Jeffrey	Abhijit Biswas
Speaker 2	Andrew Lalich	Melanie Bodiford	Jagan Ranganathan	Joseph Irudayaraj	Niki Werkheiser
Speaker 3	Carlos Soares	Ginger Flores	Akinori Saito	Karen Jonscher	Henry de Groh III
Speaker 4	Phillip Callen	Robert Corban	Jeffrey VanLooy	Kasthuri Venkateswaran	Kevin Duda
Speaker 5	Penny Roberts	Steven Huning		Ye Zhang	

12:15 pm **Luncheon** (Jackson Park Room)
Guest Speaker: John Grunsfeld, Associate Administrator, Science Mission Directorate, NASA Headquarters (See biography on Page 19)

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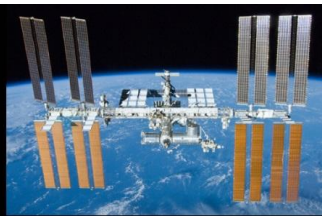
1:45 pm **Plenary 4 – Top Engineering Development and Technology Maturation Focusing on Commercial and Exploration Applications** (Grant Park Room)
Moderator: George Nelson, Manager ISS Technology Demonstration Office, NASA Johnson Space Center

- *Liquid Sloshing Behavior in Microgravity with Application to Spacecraft Propulsion Systems* – Gabriel Lapilli, Florida Institute of Technology
- *Space Experiment for In-Flight Testing of a Laser Communications System on the Russian Segment of the ISS* – Vladimir Grigoriev, Systems of Precision Instrument Making
- *Amine Swingbed Payload Technology Demonstrations* – Jeff Sweterlitsch, NASA Johnson Space Center



3:15 pm **Networking Break** *sponsored by* ULA United Launch Alliance

3:30 pm **Parallel Technical Session 2** (see pages 15-16 for details)

Room	Grant Park	Hyde Park A	Hyde Park B	Adler	Burnham B-C
Subject:	***Opportunities***	***SCaN Payload Results and Applications***	***Tech Demo – SPHERES***	***Earth Science Data for Everyone***	***Education***
Session Chair:	Rod Jones	Richard Reinhart	Andres Martinez	William Stefanov	Ken Shields
Speaker 1:	Steve Volz	François Lassere	Bruno Alvisio	Darryl Keith	Frank Bauer
Speaker 2:	Angel Otero	Robert McGwier	Terry Fong	William Stefanov	Alli Westover
Speaker 3:	Craig Kundrot	Jeffrey White	Andres Martinez	Laurie Provin	Florence Gold
Speaker 4:	George Nelson	David Robison	Timothy Setterfield	Howard Eisen	Patricia Mayes
Speaker 5:	Duane Ratliff	Dean Schrage	Andrew Zimdars		Johannes Weppler

5:30 pm **AAS ISS Utilization Technical Committee Meeting** (Dusable Room)

6:00 pm **Networking Reception with Posters and Displays** (Prairie Room)

Day 4 Thursday, June 19, 2014

How to use the ISS and make a business out of it

WiFi compliments of CASIS

7:30 am **Registration with Continental Breakfast** (Grant Park Room)

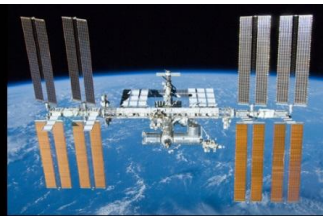
8:30 am **Plenary 5 – Top Discoveries in Microgravity** **(**Grant Park Room)
Moderator: Brad Carpenter, Chief Scientist, Space Life and Physical Sciences, NASA Headquarters

- *Global Lightning and Sprite Measurements on Japanese Experiment Module Exposed Facility (JEM-GLMIS): First Qualitative Nadir Observations of Lightning and Transient Luminous Events* – Mitsuteru Sato, Hokkaido University
- *Breathing Modes in Cellular Interface Pattern Formation* – Rohit Trivedi, Iowa State University
- *Materials International Space Station Experiment (MISSE): Overview, Accomplishments and Future Needs* – Kim de Groh, NASA Glenn Research Center

10:00 am **Networking Break**

10:15 am **Parallel Technical Session 3** (see page 16-17 for details)

Room	Grant Park	Hyde Park A	Hyde Park B	Jackson Park D	Jackson Park C
Subject:	***Integration Process***	***Human Research***	***Technology Demonstration 2***	***Upcoming Capabilities***	***Case Studies: Innovative Use of ISS***
Session Chair:	Ryan Prouty	Craig Kundrot	George Nelson	Ken Shields	Justin Kugler
Speaker 1:	Ryan Prouty	Jessica Duda	Terry Fong	Matthew Lera	Jeff Manber
Speaker 2:	Rajib Dasgupta	Max Twedt	Darwin Poritz	Howard Levine	Mike Safyan
Speaker 3:	Dave Brueneman	Albert Nechaev	Eugene Skelton	Caitlin O'Connell-Rodwell	Jeff Rath
Speaker 4:	Carmen Price	Jojo Sayson	Mike Piszczor	Twyman Clements	Bill Corley
Speaker 5:	Joel Montalbano	Graham Scott			



12:15 pm **Working Lunch with Panel Discussion** (Grant Park Room)
"Getting There and Back"
Moderator: Phil McAlister, Director, Commercial Spaceflight Development, NASA Headquarters

- Orbital Sciences Corporation – Frank Culbertson
- SpaceX – Joshua Brost
- Sierra Nevada Corporation – John Olson
- Boeing – Chris Ferguson
- Blue Origin – Erika Wagner

2:15 pm **Networking Break**

2:30 pm **Entrepreneurship on the ISS – Case Studies**
Moderator: Justin Kugler, Business Development Manager, CASIS

- D-Orbit – Luca Rossettini
- Benevolent Technologies – Jeremy Jo
- Kentucky Space – Kris Kimel
- Zero Gravity Solutions – Rich Godwin
- HNu-Photonics – Dan O'Connell

4:30 pm **Adjourn**

See You Next Year!

4th Annual International Space Station Research and Development Conference

When:	**July 7-9, 2015**
Where:	**Boston Marriott Copley Place**
	Boston, Massachusetts (New Location)
Call for Papers:	**September 2014**
	www.astronautical.org
Abstracts Due:	**March 1, 2015**

Details - Parallel Technical Sessions

Day 3, Wednesday June 18, 2014

10:00AM – 12:00PM Parallel Technical Session One

Grant Park	Hyde Park A	Hyde Park B	Adler	Burnham B-C
ISS External Capabilities	ISS Internal Capabilities	Earth and Space Science	Biology and Biotechnology	Technology Demonstration 1
Chair: Bridget Ziegelaar	Chair: Steve Huning	Chair: Steve Volz	Chair: Emily Roberge	Chair: Ryan Stephan

ISS External Capabilities – Bridget Ziegelaar, NASA Johnson Space Center

- *External Platforms – Columbus, JEM External Facility (JEM-EF) and External Logistics Carriers (ELC);* Bridget Ziegelaar, NASA Johnson Space Center
- *ISS Pointing Approaches and Best Practices*; Andrew Lalich, United Space Alliance
- *ISS External Contamination Environment for Space Science Utilization*; Carlos Soares, Boeing
- *Robotics Transfer and Interfaces;* Phillip Callen, NASA Johnson Space Center
- *ISS Data and Communications Systems: Current Capabilities and Future Possibilities*; Penny Roberts, NASA Johnson Space Center

ISS Internal Capabilities – Steve Huning, NASA Johnson Space Center

- *ISS Data and Communications Systems: Current Capabilities and Future Possibilities*; Brett Willman, NASA Johnson Space Center
- *Operations Services*; Melanie Bodiford, NASA Marshall Space Flight Center
- *ExPRESS Rack, Window Observational Research Facility (WORF) and Microgravity Sciences Glovebox (MSG) Platforms;* Ginger Flores, NASA Marshall Space Flight Center
- *Integrated Fluids and Combustion Racks and Microscope Capabilities*; Robert Corban, NASA Glenn Research Center
- *JEM Airlock Capabilities;* Steve Huning, NASA Johnson Space Center

Earth and Space Science – Steve Volz, NASA Headquarters

- *A Web-Enabled Geospatial Data Processing System*; James Goodman, HySpeed Computing
- *ISERV Pathfinder – Operations and Statistics*; Jagan Ranganathan, Universities Space Research Association
- *ISS-IMAP: Ionosphere, Mesosphere, Upper Atmosphere, and Plasmasphere Mapping Mission*; Akinori Saito, Kyoto University
- *ISS Agricultural Camera (ISSAC): Land Cover Research using a Three Band Camera;* Jeffrey VanLooy, University of North Dakota

Biology and Biotechnology – Emily Roberge, CASIS

- *Short Exposure of Neural Cells to Simulated Microgravity Impacts Cell Proliferation, Cell Migration and Lineage Progression*; Araceli Espinosa-Jeffrey, The University of California, Los Angeles
- *Effects of Stimulated Microgravity on the Epigenetic Landscape of 5-methylcytosine and 5-hydroxymethylcytosine in Lymphoblastoid Cells*; Joseph Irudayaraj, Purdue University

- *Of Mice and Microgravity: Does spaceflight alter metabolic function?*; Karen Jonscher, University of Colorado Anschutz Medical Campus
- *ISS Environmental Microbiome – A Genetic Approach to Elucidate Microbial Inventories of ISS Filter Debris;* Kasthuri Venkateswaran, NASA Jet Propulsion Laboratory
- *Interphase Chromosome Conformation and Chromatin-chromatin Interactions in Human Epithelial Cells Cultured under Different Gravity Condition;* Ye Zhang, Wyle

Technology Demonstration 1 – Ryan Stephan, NASA Headquarters

- *The Optical Payload for Lasercomm Science (OPALS): Results from Early Operations*; Abhijit Biswas, NASA Jet Propulsion Laboratory
- *3D Printing In Zero-G ISS Technology Demonstration*; Niki Werkheiser, NASA Marshall Space Flight Center
- *Coatings for Rubber Seals to Prevent Adhesion and Damage from the Space Environment;* Henry de Groh III, NASA Glenn Research Center
- *Wearable Control Moment Gyroscopes: A Technology Enabler for Space Exploration Missions;* Kevin Duda, Draper Laboratory

3:30PM – 5:30PM Parallel Technical Session Two

Grant Park	Hyde Park A	Hyde Park B	Adler	Burnham B-C
Opportunities	SCaN Payload Results and Applications	Technology Demo – SPHERES	Earth Science Data for Everyone	Education
Chair: Rod Jones	Chair: Richard Reinhart	Chair: Andres Martinez	Chair: William Stefanov	Chair: Ken Shields

Opportunities – Rod Jones, NASA Johnson Space Center/TBD, CASIS

- *Science Mission Directorate Opportunities*; Steve Volz, NASA Headquarters
- *Space Life and Physical Sciences Opportunities*; Angel Otero, NASA Headquarters
- *Human Research Program Opportunities;* Craig Kundrot, NASA Johnson Space Center
- *Technology Demonstration Opportunities;* George Nelson, NASA Johnson Space Center
- *CASIS Opportunities*; Duane Ratliff, CASIS

Space Communication and Navigation (SCaN) Payload Results and Applications – Richard Reinhart, Glenn Research Center

- *International Disruption Tolerant Networking Tests Using the Space Link Extension Protocol for Ground Connectivity*; François Lassere, Centre National d'Etudes Spatiales (CNES)
- *Signal Classification and Interference Mitigation in the Unique Space Environment*; Robert McGwier, Virginia Polytechnic Institute and State University
- *Unique Aspects of Software Defined Radios Operating in Space as Experiment on ISS;* Jeffrey White, Florida Institute of Technology
- *ISS Orbit Determination with a Multi-Frequency Software-Defined GPS Receiver*; David Robison, NASA Jet Propulsion Laboratory
- *ISS Truss Flexure Measurement applying Ka-Band Closed-Loop Tracking;* Dean Schrage, ZIN Technologies Inc.

Technology Demonstration – Synchronized Position, Hold, Engage, Reorient, Experimental Satellites (SPHERES) – Andres Martinez, NASA Ames Research Center

- *Using the ISS as a Testbed for Iterative Control Development for Electromagnetic Formation Flight*; Bruno Alvisio, Massachusetts Institute of Technology
- *Development and Testing of the Smart SPHERES Telerobotic Free-Flyer*; Terry Fong, NASA Ames Research Center
- *SPHERES National Lab Facility - Available to Conduct Research;* Andres Martinez, NASA Ames Research Center
- *Iterative Testing of Vision Based Navigation in Microgravity using SPHERES and VERTIGO aboard the ISS*; Timothy Setterfield, Massachusetts Institute of Technology
- *Real-Time Joint Teleoperation of Multiple Robotic Space Platforms;* Andrew Zimdars, Lockheed Martin Space Systems Co.

Earth Science Data for Everyone – William Stefanov, NASA Johnson Space Center

- *Smart Phone Application Development for Coastal and Ocean Monitoring using Hyperspectral Imager for the Coastal Ocean (HICO) Imagery*; Darryl Keith, Environmental Protection Agency
- *ISS Data Collection For Disaster Response;* William Stefanov, NASA Johnson Space Center
- *Multi-User System for Earth Sensing (MUSES);* Laurie Provin, Teledyne Brown Engineering
- *Rapid Scatterometer (RapidScat);* Howard Eisen, NASA Jet Propulsion Laboratory

Education – Ken Shields, CASIS

- *Amateur Radio on the ISS (ARISS)---Inspiring and Educating Youth through Direct Connections with the ISS Crew*; Frank Bauer, AMSAT-NA
- *CASIS National Design Challenge Pilot Project;* Alli Westover, CASIS
- *High School Students United with NASA to Create Hardware (HUNCH) Extreme Science Program;* Florence Gold, Texas A&M University
- *NanoRacks Education;* Patricia Mayes, NanoRacks, LLC
- *Columbus Eye and Other Educational Activities during Alexander Gerst's Mission to the ISS;* Johannes Weppler, German Aerospace Center (DLR)

Day 4, Thursday June 19, 2014

10:15AM – 12:15PM Parallel Technical Session Three

Grant Park	Hyde Park A	Hyde Park B	Jackson Park D	Jackson Park C
Integration Process	Human Research	Technology Demonstration 2	Upcoming Capabilities	Case Studies: Use of ISS
Chair: Ryan Prouty	Chair: Craig Kundrot	Chair: George Nelson	Chair: Ken Shields	Chair: Justin Kugler

Integration Process – Ryan Prouty, NASA Johnson Space Center

- *Payload Integration Template and Improvements*; Ryan Prouty, NASA Johnson Space Center
- *Safety Process;* Rajib Dasgupta, NASA Johnson Space Center
- *Requirements and Verification;* Dave Brueneman, Boeing
- *Operations Integration;* Carmen Price, NASA Marshall Space Flight Center

- *Question and Answer/ Help Session;* Joel Montalbano, NASA Johnson Space Center

Human Research – Craig Kundrot, NASA Johnson Space Center

- *Enhanced Dynamic Load Sensors for ISS (EDLS-ISS)*; Jessica Duda, Aurora Flight Sciences
- *In Vivo Porcine Tests Towards Noninvasive ICP Monitoring;* Max Twedt, University of Nebraska-Lincoln
- *Biomedical Studies At Orbital Stations And Their Terrestrial Application;* Albert Nechaev, Institute for Biomedical Problems of the Russian Academy of Sciences
- *Back Pain Mechanisms on the ISS: a preliminary report*; Jojo Sayson, The University of California San Diego
- *Twin Sons – A Pilot Demonstration ISS Study, As a First Step To Personalized Medicine in Space;* Graham Scott, National Space Biomedical Research Institute

Technology Demonstration 2 – George Nelson, NASA Johnson Space Center

- *Crew-controlled Surface Telerobotics from the ISS*; Terry Fong, NASA Ames Research Center
- *Pre-Flight Advanced Clothing Study;* Darwin Porritz, NASA Johnson Space Center
- *Raven Rendezvous and Proximity Operations Sensor Experiment;* Eugene Skelton, Lockheed Martin
- *On-Orbit Measurement of Next Generation Space Solar Cell Technology on the ISS;* Mike Piszczor, NASA Glenn Research Center

Upcoming Capabilities – Ken Shields, CASIS

- *Fruit Fly Lab: A Hardware Suite with Flight Heritage Developed to Support Drosophila Research On-board ISS*; Matthew Lera, Lockheed Martin
- *Life Science Hardware Available for Use on ISS;* Howard Levine, NASA Kennedy Space Center
- *Stem Cell Microfluidic Incubator with Imaging;* Caitlin O'Connell-Rodwell, HNu Photonics
- *Designing ISS platforms for high throughput research and commercialization;* Twyman Clements, Kentucky Space

Case Studies: Innovative Utilization of ISS – Justin Kugler, CASIS

Jeff Manber will lead a conversation regarding why these companies chose to use the ISS, what works, what doesn't work, and how to get management to buy into using the ISS as it exists today.

- Jeff Manber, NanoRacks
- Mike Safyan, PlanetLabs
- Jeff Rath, Urthecast
- Bill Corley, Teledyne Brown Engineering

NASA Astronaut Nicole Stott

Guest Luncheon Speaker

Space Flight Experience: Nicole completed her first long-duration space flight as a Flight Engineer on Expeditions 20 and 21. She launched to the ISS on Space Shuttle Discovery with the crew of STS-128 on August 28, 2009. She performed one spacewalk along with her STS-128 crewmate John "Danny" Olivas, with a total duration of 6 hours and 39 minutes. She returned on the Space Shuttle Atlantis with the crew of STS-129 on November 29, 2009. Stott was the last expedition crewmember to return to Earth on a space shuttle.

Nicole completed her second space flight as a Mission Specialist on STS-133 (February 24 - March 9, 2011), which was the 39th and final mission for Space Shuttle Discovery. Nicole worked with Astronaut Michael Barratt, flying the space station robotic arm for the installation of the ELC-4 and PMM, which completed the assembly of the U.S. portion of the station. She also served as the onboard EVA crewmember, directing the mission's two space walks; and she served as Flight Engineer for entry. After completion of the STS-133 mission, Nicole worked a one-year assignment at KSC as the Astronaut Office representative to the Commercial Crew Program. She currently works at JSC as the Astronaut Office Space Station Integration Branch Chief.

NASA Experience: In 1988, Nicole joined NASA at the Kennedy Space Center (KSC), Florida, as an Operations Engineer in the Orbiter Processing Facility (OPF). During her time at KSC, she held a variety of positions within NASA Shuttle Processing, including Vehicle Operations Engineer; NASA Convoy Commander; Shuttle Flow Director for Endeavour; and Orbiter Project Engineer for Columbia. During her last two years at KSC, she was a member of the Space Station Hardware Integration Office and relocated to Huntington Beach, California, where she served as the NASA Project Lead for the ISS truss elements under construction at the Boeing Space Station facility. In 1998, she joined the Johnson Space Center (JSC) team in Houston, Texas, as a member of the NASA Aircraft Operations Division, where she served as a Flight Simulation Engineer (FSE) on the Shuttle Training Aircraft (STA).

Selected as a mission specialist by NASA in July 2000, Nicole reported for astronaut candidate training in August 2000. Following the completion of training, she was assigned technical duties in the Astronaut Office International Space Station Operations branch, where she performed crew evaluations of station payloads. She also worked as a support astronaut for the Expedition 10 crew and as a Capsule Communicator (CAPCOM). In April 2006 she was a crewmember on the ninth NASA Extreme Environment Mission Operations (NEEMO 9) mission, where she lived and worked with a six-person crew on the longest duration NEEMO mission to date – 18 days on the Aquarius undersea research habitat. The NEEMO 9 mission served as an analog for future lunar operations – the crew tested advanced space suit design concepts, robotic devices for surface-based exploration, construction and communication techniques, and advanced tele-medicine hardware and techniques. In preparation for a long-duration space flight, Nicole completed a Russian language immersion class in Moscow, Russia, and underwent International Space Station systems training at each of the international partner training sites in Russia, Japan, Germany, and Canada.

Special Honors: NASA Space Flight Medals; NASA Distinguished Service Medals; NASA Exceptional Achievement Medal; NASA Certificates of Commendation; NASA Performance Awards; NASA On-the-Spot Awards; 2012 Florida Aviation Hall of Fame Inductee; 2011 Russian Medal of Merit for Space; 2011 University of Central Florida Professional Achievement Award; 2009 Embry Riddle Aeronautical University Alumni Eagle of Excellence Award; NASA Aircraft Operations Newt Myers Team Spirit Award; KSC Public Affairs Certificate of Appreciation for Service.

John Grunsfeld

NASA Associate Administrator, Science Mission Directorate

Guest Luncheon Speaker

Space Flight Experience: STS-67/Astro-2 Endeavour (March 2 to March 18, 1995) launched from Kennedy Space Center, Florida, and landed at Edwards Air Force Base, California. It was the second flight of the Astro observatory, a unique complement of three ultraviolet telescopes. During this record-setting 16-day mission, the crew conducted observations around the clock to study the far ultraviolet spectra of faint astronomical objects and the polarization of ultraviolet light coming from hot stars and distant galaxies. Mission duration was 399 hours and 9 minutes.

STS-81 Atlantis (January 12 to January 22, 1997) was a 10-day mission, the fifth to dock with Russia's Space Station Mir and the second to exchange U.S. astronauts. The mission also carried the Spacehab double module, providing additional middeck locker space for secondary experiments. In 5 days of docked operations, more than 3 tons of food, water, experiment equipment and samples were moved back and forth between the two spacecraft. Grunsfeld served as the flight engineer on this flight. Following 160 orbits of the Earth, the STS-81 mission concluded with a landing on Kennedy Space Center's Runway 33, ending a 3.9-million-mile journey. Mission duration was 244 hours and 56 minutes.

STS-103 Discovery (December 19 to December 27, 1999) was an 8-day mission, during which the crew successfully installed new gyroscopes and scientific instruments and upgraded systems on the Hubble Space Telescope (HST). Enhancing HST scientific capabilities required three spacewalks (EVAs). Grunsfeld performed two spacewalks, totaling 16 hours and 23 minutes. The STS-103 mission was accomplished in 120 Earth orbits, traveling 3.2 million miles in 191 hours and 11 minutes.

STS-109 Columbia (March 1 to March 12, 2002) was the fourth HST servicing mission. The crew of STS-109 successfully upgraded the HST, installing a new digital camera, a cooling system for the infrared camera, new solar arrays and a new power system. HST servicing and upgrades were accomplished by four crewmembers during a total of five EVAs in 5 consecutive days. As Payload Commander on STS-109, Grunsfeld was in charge of the spacewalking activities and the Hubble payload. He also performed three spacewalks totaling 21 hours and 9 minutes, including the installation of the new Power Control Unit. STS-109 orbited the Earth 165 times and covered 3.9 million miles in over 262 hours.

STS-125 Atlantis (May 11 to May 24, 2009) was the fifth and final Hubble servicing mission. After 19 years in orbit, the telescope received a major renovation that included the installation of a new wide-field camera, a new ultraviolet telescope, new batteries, a guidance sensor, gyroscopes and other repairs. Grunsfeld served as the lead spacewalker in charge of the spacewalking and Hubble activities. He performed three of the five spacewalks on this flight, totaling 20 hours and 58 minutes. For the first time while in orbit, two scientific instruments were surgically repaired in the telescope. The STS-125 mission was accomplished in 12 days, 21 hours, 37 minutes and 09 seconds, traveling 5,276,000 miles in 197 Earth orbits.

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